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FEE TRANSMITTAL for FY 2004

Effective 10/01/2003. Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 330.00

Complete if Known	
Application Number	09/740708
Filing Date	December 19, 2000
First Named Inventor	Chandley
Examiner Name	Janelle A. Combs-Morillo
Art Unit	1742
Attorney Docket No.	GP-300142

METHOD OF PAYMENT *(check all that apply)*

☐ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

☑ Deposit Account:

Deposit Account Number: 07-0960

Deposit Account Name: General Motors Corporation

The Director is authorized to: *(check all that apply)*

☑ Charge fee(s) indicated below ☑ Credit any overpayments

☑ Charge any additional fee(s) or any underpayment of fee(s)

☐ Charge fee(s) indicated below, **except for the filing fee** to the above-identified deposit account.

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	770	2001	385	Utility filing fee	
1002	340	2002	170	Design filing fee	
1003	530	2003	265	Plant filing fee	
1004	770	2004	385	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	

SUBTOTAL (1) ($)

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

		Extra Claims		Fee from below		Fee Paid
Total Claims		-20** =		X	=	
Independent Claims		- 3** =		X	=	
Multiple Dependent					=	

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	86	2201	43	Independent claims in excess of 3
1203	290	2203	145	Multiple dependent claim, if not paid
1204	86	2204	43	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($)

***or number previously paid, if greater; For Reissues, see above*

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1051	130	2051	65	Surcharge - late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for *ex parte* reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	
1252	420	2252	210	Extension for reply within second month	
1253	950	2253	475	Extension for reply within third month	
1254	1,480	2254	740	Extension for reply within fourth month	
1255	2,010	2255	1,005	Extension for reply within fifth month	
1401	330	2401	165	Notice of Appeal	
1402	330	2402	165	Filing a brief in support of an appeal	$330.00
1403	290	2403	145	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive - unavoidable	
1453	1,330	2453	665	Petition to revive - unintentional	
1501	1,330	2501	665	Utility issue fee (or reissue)	
1502	480	2502	240	Design issue fee	
1503	640	2503	320	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17(q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	770	2809	385	Filing a submission after final rejection (37 CFR 1.129(a))	
1810	770	2810	385	For each additional invention to be examined (37 CFR 1.129(b))	
1801	770	2801	385	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($) 330.00

SUBMITTED BY

(Complete *(if applicable)*)

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Signature	Kathryn A Marra			Date	23-APR-04

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

April 23, 2004

Applicants: George D. Chandley, et al.

Title : TITANIUM ALUMINIDE MATERIAL RESISTANT TO MOLTEN ALUMINUM

Serial No.: 09/740,708

Filed : December 19, 2000 Confirmation No. 5022

Examiner: Janelle A. Combs-Morillo Group 1742

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANT'S BRIEF ON APPEAL

Dear Sir:

This is an appeal from the decision of the Examiner dated November 26, 2003, finally rejecting claims 10-24.

REAL PARTY IN INTEREST

The real party in interest is General Motors Corporation, the assignee of the entire right, title and interest in the above application.

RELATED APPEALS AND INTERFERENCES

There are no appeals or interferences known to Applicant or the undersigned, which will directly affect, or be affected by or have a bearing on the Board's decision in the appeal.

STATUS OF CLAIMS

Claims 10-24 are pending, finally rejected, and are the claims on appeal. The pending claims appear in the Appendix.

STATUS OF AMENDMENTS

A response to the final rejection was filed and was entered.

SUMMARY OF THE INVENTION

The invention as defined by independent claim 10 is directed to a method of increasing the service life of a titanium aluminide alloy in contact with a molten metallic material comprising aluminum by including in the titanium aluminide alloy a rare earth element in an effective amount to prolong resistance to attack of the alloy by the molten metallic material (see page 1, lines 31-35 and page 3, lines 6-10) and contacting the alloy with the molten metallic material (page 2, lines 1-6 and page 4, lines 17-20).

Claim 11 depends from claim 10 and recites that the rare earth element is included in a predominantly gamma phase TiAl alloy page 3, lines 20-23).

Claim 12 depends from claim 10 and recites that the rare earth element comprises Y included in an amount of about 1.5% to about 5.5% by weight of the titanium aluminide alloy (see page 3, lines 29-32).

Claim 13 depends from claim 10 and further recites forming a surface oxide in-situ on the titanium aluminide alloy (see page 2, lines 7-11 and page 4, lines 13-15).

Claim 14 depends from claim 13 and recites that the surface oxide is formed by cooling a hot casting comprising the titanium aluminide alloy in air (see page 8, lines 4-7).

Claim 15 depends from claim 13 and recites that the surface oxide is formed by heating the titanium aluminide alloy in an oxygen bearing atmosphere (see page 8, lines 8-14).

Independent claim 16 involves a method of prolonging resistance of a titanium aluminide alloy to a molten metallic material comprising aluminum by contacting the titanium aluminide alloy for a time with the molten metallic material (page 2, lines

11-15 and page 5, lines 12-16), removing the titanium aluminide alloy from contact with the molten metallic material (page 5, line 16), cleaning the titanium aluminide alloy to remove the metallic material thereon (page 5, lines 17-18), heating the titanium aluminide alloy in an oxygen-bearing atmosphere at elevated superambient temperature to form a surface oxide thereon (page 5, 19-20), and re-contacting the titanium aluminide alloy having the surface film thereon with the molten metallic material (page 5, lines 20-21).

Claim 17 depends from claim 16 and further recites including, prior to first contacting the titanium aluminide alloy with the molten metallic material, heating the alloy in an oxygen-bearing atmosphere at elevated temperature to form a surface oxide thereon (page 2, lines 7-11 and page 5, lines 12-13).

Claim 18 depends from claim 16 and further recites providing a rare earth element in the titanium aluminide alloy (page 1, lines 31-35; page 3, lines 6-10 and page 5, lines 12-13).

Claim 19 depends from claim 18 and recites that the rare earth element is provided in a predominantly gamma phase TiAl alloy (page 3, lines 20-23).

Claim 20 depends from claim 18 and recites that the rare earth element is Y (page 2, lines 1-6 and page 3, lines 20-32).

Independent claim 21 involves a method of die casting a molten metallic material comprising aluminum wherein the molten metallic material is introduced into a die from a shot sleeve using a plunger in the shot sleeve, wherein the improvement comprises providing one or more of the die, shot sleeve, and plunger as a titanium aluminide alloy including a rare earth element in an effective amount to prolong resistance to attack of the die, shot sleeve and/or plunger by the molten metallic material (page 2, lines 18-23).

Claim 22 depends from claim 21 and recites that the titanium aluminide alloy includes Y (page 2, lines 1-6 and page 3, lines

20-32).

Claim 23 depends from claim 22 and recites that Y is present in the titanium aluminide alloy in an amount of about 1.5% to about 5.5% by weight of the alloy (page 3, lines 29-32).

Claim 24 depends from claim 21 and recites a core element disposed in the die and comprising the titanium aluminide alloy (page 2, lines 18-20 and page 8, lines 16-32).

ISSUES

FIRST ISSUE

The first issue presented for review is whether the subject matter of claims 10-15 and 21-24 is obvious under 35 USC 103(a) in view of the WO 00/45973 document (WO'973) taken with the Nazmy et al. US Patent 5 286 442 ('442 patent).

SECOND ISSUE

The second first issue presented for review is whether the subject matter of claims 16-20 is obvious under 35 USC 103(a) in view of the WO 00/45973 document (WO'973) taken with the Nazmy et al. US Patent 5 286 442 ('442 patent) and the further Choudbury et al. US Patent 6 443 212 ('212 patent).

THIRD ISSUE

The third first issue presented for review is whether the subject matter of claims 10-15 and 21-24 is properly rejected under the judicially created doctrine of obviousness-type double patenting over claims 1-14 of US Patent 6,283,195 ('195 patent) taken with the Nazmy et al. US Patent 5 286 442 ('442 patent).

GROUPING OF THE CLAIMS

Claims 10-24 do not stand or fall together. For example, claim 10 is an independent claim that stands alone. Claim 11 depending from claim 10 is believed separately patentable in further reciting that the rare earth element is included in a predominantly gamma TiAl alloy. Claim 12 depending from claim 10 is believed separately patentable in further reciting that the rare earth element comprises Y present in an amount of about 1.5% to about 5.5 % by weight of the titanium aluminide alloy. Claims 13, 14, and 15 stand or fall with claim 10.

Claim 16 is an independent claim and is believed separately patentable from the preceding claims in reciting different method steps of contacting the titanium aluminide alloy for a time with the molten metallic material, removing the titanium aluminide alloy from contact with the molten metallic material, cleaning the titanium aluminide alloy to remove the metallic material thereon, heating the titanium aluminide alloy in an oxygen-bearing atmosphere at elevated superambient temperature to form a surface oxide thereon, and re-contacting the titanium aluminide alloy having the surface film thereon with the molten metallic material. Claim 17 stands or falls with claim 16. Claim 18 depending from claim 16 is believed separately patentable in further reciting to provide a rare earth element in the titanium aluminide alloy. Claim 19 depending from claim 18 is believed separately patentable in further reciting that the rare earth element is provided in a predominantly gamma phase TiAl alloy. Claim 20 depending from claim 18 is believed separately patentable in further reciting that the rare earth element is Y.

Claim 21 is an independent claim and is believed separately patentable from the preceding claims in reciting a method of die casting a molten metallic material comprising aluminum. Claim 22 depending from claim 21 is believed separately patentable in further reciting that the titanium aluminide alloy includes Y.

Claim 23 depending from claim 22 is believed separately patentable in further reciting that Y is present in the titanium aluminide alloy in an amount of about 1.5% to about 5.5% by weight of the alloy. Claim 24 depending from claim 21 is believed separately patentable in reciting a core element disposed in the die wherein the core element comprises the titanium aluminide alloy.

ARGUMENT

FIRST ISSUE:

The rejection of claims 10-15 and 21-24 as obvious under 35 USC 103(a) in view of WO 00/45973 document (WO'973) taken with the Nazmy et al. US Patent 5 286 442 ('442 patent) is in error.

In particular, the WO '973 document is utterly silent with respect to a method of increasing the service life of a titanium aluminide alloy in contact with a molten metallic material comprising aluminum by including in the titanium aluminide alloy a rare earth element in an amount effective to prolong resistance to attack of the alloy by the molten metallic material. The examiner expressly acknowledges this deficiency of the WO'973 document on page 2, last paragraph of the final rejection.

The examiner attempts to find the method missing from the WO'973 document in the '442 patent. The examiner argues that the '442 patent teaches certain alloying additions, such as yttrium (Y), to titanium aluminide to provide excellent hardness and strength at high temperatures, enabling the field of application of the resulting alloyed titanium aluminide alloys to be extended to temperatures between 600-1000 degrees C. The examiner refers to exemplary embodiments 54 and 56 and alloys 14, 15, 21, and 23 of the '442 patent as illustrating that the field of application of the modified Ti-Al alloys of the '442 patent can be extended to temperatures between 600 to 1000 degrees C. The examiner argues that it would have been obvious to add the yttrium of the '442 patent to the titanium aluminide alloy of the WO'973

document.

Applicants disagree with the examiner's rejection of independent claims 10 and 21 and those claims depending therefrom on this basis. Firstly, Applicants are claiming in claims 10-15 a method of increasing the service life of a titanium aluminide alloy in contact with a molten metallic material comprising aluminum beyond the service life of the titanium aluminide alloy provided by WO'973 itself. Claims 21-24 are similar with respect to prolonging the resistance to attack of one or more of a die casting die, shot sleeve, and plunger. The examiner incorrectly ignores that Applicants' claims 10-15 recite a method of increasing the service life of a titanium aluminide alloy rather than an alloy composition per se. The examiner likewise incorrectly ignores that claims 21-24 recite a method of prolonging the resistance to attack of one or more of die casting die, shot sleeve, and plunger.

The '442 patent by the examiner's own admission discloses certain alloying additions to titanium aluminide to provide excellent hardness and strength at high temperatures and teaches absolutely nothing with respect to Applicants' claimed methods set forth in claims 10-15 and 21-24 wherein resistance to attack of a titanium aluminide alloy by molten metallic material comprising aluminum is prolonged by inclusion of a rare earth element in the titanium aluminide alloy.

Secondly, the determination of mechanical properties, such as hardness and tensile strength, in an air environment as taught in the '442 patent teaches absolutely nothing about the resistance of the titanium alloys to attack by contact with a molten metallic material comprising aluminum. Nowhere in the WO '973 document or the '442 patent is there any disclosure or suggestion of a method of increasing the service life of a titanium aluminide alloy in contact with a molten metallic material comprising aluminum by including in the titanium aluminide alloy a rare earth element in an effective amount to

prolong resistance to attack of the alloy by the molten metallic material. The examiner is believed to be incorrect in using mechanical property test data determined for titanium aluminide alloys in air to extrapolate or predict the effect of an alloying element, such as a rare earth element, on resistance of a titanium aluminide alloy to attack by molten metallic material comprising aluminum. To do so as argued by the examiner amounts to mere speculation on the examiner's part.

The examiner's argument, in effect, seems to be based on speculation that inclusion of yttrium in the WO'973 document inherently results in prolonging the resistance of the titanium aluminide machine components to molten aluminum material. However, the examiner's argument to this end is believed to be violative of accepted case law as set forth In re Spormann, 150 USPQ 449 (CCPA 1966), which established that "[t]hat which may be inherent is not necessarily known. Obviousness cannot be predicated on what is unknown".

Applicants' claims 10-15 and 21-24 describe methods which are not known from the WO'973 document or the '442 patent taken alone or together. There simply is no teaching in the '442 patent that would lead one skilled in the art to arrive at Applicants' claimed method for increasing the service life of a titanium aluminide alloy in contact with a molten metallic material comprising aluminium.

Thirdly, Applicants refer to page 4 of Applicants' specification where the resistance of different specimens to attack by molten aluminum at 700 degrees C is described and shown in the TABLE. The TABLE reveals that resistance to attack was increased by more than 2 times for the titanium aluminide alloy including 1.5 weight % Y pursuant to the invention as compared to the titanium alloy without Y (i.e. 0 weight % Y) that is representative of the titanium aluminide alloy of the WO'973 document. The TABLE also reveals that resistance to attack was increased by more than 4 times for the titanium aluminide alloy

including 5.0 weight % Y pursuant to the invention as compared to the titanium alloy without Y (i.e. 0 weight % Y) that is representative of the titanium aluminide alloy of the WO'973 document.

Neither the WO '973 document nor the '442 patent provides any disclosure or suggestion whatsoever that resistance to such attack can be so dramatically prolonged by including a rare earth element in a titanium aluminide alloy. The examiner's argument that the '442 patent teaches adding a rare earth element to improve "temperature resistance" fails to address and acknowledge the utter lack of any teaching in either the WO'973 document or the '442 patent that resistance to attack of a titanium aluminide alloy by molten metallic material comprising aluminum can be dramatically prolonged as recited in Applicants' method claims 10-15 and 21-24. Applicants believe that such unexpected improvements as described in Applicants' specification are not known from the WO'973 document and the '442 patent in accordance with the In re Spormann decision cited above.

Fourthly, Applicants disagree with the proposed combination of the '442 patent with the WO '973 document to reject Applicants' claims 10-15 and 21-24. As pointed out above, the WO '973 document makes no disclosure or suggestion to include a rare earth element for any purpose. The '442 patent discloses only an improvement in hardness and strength achieved in testing that is conducted in ambient air. As mentioned above, the examiner is incorrect in using mechanical property test data determined for titanium aluminide alloys in air to extrapolate or predict the effect of an alloying element, such as a rare earth element, on resistance of the alloy to attack by molten metallic material comprising aluminum. To do so amounts to mere speculation on the examiner's part and clearly is violative of the above-cited In re Spormann decision.

Fifthly, the examiner can arrive at Applicants' method claims 10-15 and 21-24 only through a prohibited hindsight

analysis after having knowledge of the claimed invention. The examiner admits that the WO '973 document is deficient with respect to Applicants' claims. That the '442 patent discloses to add various alloying elements to a Ti-Al alloy to improve hardness and strength in air teaches nothing whatsoever with respect to Applicant's method claims directed to increasing the service life of the titanium aluminide alloy by prolonging resistance to attack by molten metallic material comprising
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aluminum.

The hindsight nature of the rejection is evident in the examiner's choosing only Y as the alloying element from the '442 patent for inclusion in the '973 document out of the numerous alloying elements listed in the '442 patent. For example, the '442 patent lists Co, Cr, Ge, Hf, Mn, Mo, Nb, Pd, Ta, V, W, Y, and/or Zr as alloying elements to improve hardness and strength in air testing. The examiner picks only the Y alloying element from among those listed to reject claims 10-15 and 21-24 without any teaching in the '442 patent that Y or any of the other numerous alloying elements listed would have an effect of any kind on the alloy with respect to attack by a molten metallic material comprising aluminum. The '442 patent does not suggest that any of the numerous additions referred to by the examiner, including Y, would have an effect of any kind on the alloy with respect to attack by such molten material.

For the above reasons, independent claims 10 and 21 are believed to patentably distinguish over the cited WO'973 document taken with the '422 patent. With respect to the depending claims, claim 11 recites including the rare earth element in a predominantly gamma TiAl to increase its service life in contact with the molten metallic material comprising aluminum in a manner not suggested by the cited references. Likewise, claims 12 and 22-23 recite including yttrium in a particular amount in a titanium aluminide alloy to increase its service life in contact with the

molten metallic material comprising aluminum in a manner not suggested by the cited references. Claim 24 recites disposing a core element in a die wherein the core element comprises a titanium aluminide alloy having a rare earth element therein to increase its service life in contact with the molten metallic material comprising aluminum in a manner not suggested by the cited references.

The cited references taken alone or together do not render obvious Applicants' claims 10-15 and 21-24. The Section 103 rejection of claims 10-15 and 21-24 is believed to be violative of the In re Spormann decision cited above as well as the Graham v. Deere fountainhead decision regarding obviousness.

SECOND ISSUE:

The rejection of claims 16-20 as obvious under 35 USC 103(a) in view of WO 00/45973 document (WO'973) taken with the Nazmy et al. US Patent 5 286 442 ('442 patent) and the further Choudbury et al. US Patent 6 443 212 ('212 patent) is in error.

The WO'973 document and the '442 patent are silent with respect to claims 16-20. For example, neither reference discloses or suggests the combination of steps for prolonging resistance of a titanium aluminide alloy to a molten metallic material comprising aluminum by contacting the alloy for a time with the molten metallic material, removing the alloy from contact with the molten metallic material, cleaning the alloy to remove the metallic material thereon, heating the alloy in an oxygen-bearing atmosphere at elevated superambient temperature to form a surface oxide thereon, and re-contacting the alloy having the surface oxide thereon with the molten metallic material.

The examiner acknowledges on page 4, third paragraph of the final rejection that the WO'973 document does not disclose certain steps set forth in claims 16-20. In particular, the examiner acknowledges that WO'973 does not specify reheating to form a surface oxide ((designated step a) by the examiner)).

However, despite this acknowledgment, the examiner proceeds to argue that the temperature of molten aluminum is sufficient to reform a oxide surface film. The examiner is believed to be merely speculating with respect to formation of the surface oxide by virtue of the temperature of the molten aluminum. There is no support in the WO'973 document or the '422 patent for the examiner's argument. In contrast, Applicants' claims 16-20 recite a combination of steps involving reheating the titanium aluminide alloy in an oxygen-bearing atmosphere at elevated superambient temperature to form a surface oxide thereon after cleaning of the titanium aluminide alloy to remove the metallic material thereon.

The examiner also acknowledges on page 4, third paragraph of the final rejection that the WO'973 document does not specify cleaning the titanium aluminide alloy to remove metallic material ((designated step b) by the examiner)). The examiner proceeds to argue that the '212 patent teaches at column 1, lines 20-26 that it is conventional to inspect and clean TiAl molds when necessary as described at column 7, lines 3-4.

The examiner is believed to be in error and to have misconstrued the '212 patent. In particular, the '212 patent expressly discloses to cast the Ti-containing materials that are specifically identified in the table at column 1, lines 20-26. The table lists titanium aluminide as a Ti-containing material that can be cast. That is, column 1, lines 20-26 and the table of the '212 patent referred to by the examiner do <u>not</u> refer to mold materials as argued by the examiner, but in contrast refer to the molten metals and alloys to be melted and cast in molds later described in the patent. The examiner is patently incorrect in referring to column 1, lines 20-26 as describing mold materials when, in contrast, the table lists metals and alloys to be melted and cast. Contrary to the examiner's argument, the '212 patent does <u>not</u> disclose that it is conventional to inspect and clean TiAl molds.

The examiner refers to column 7, line 3-4 of the '212 patent

as disclosing periodic inspection and cleaning of TiAl molds. The examiner again is patently is incorrect in making this argument. In particular, at column 4, lines 21-30 of the '212 patent, the patent discloses heat-resistant steel mold parts 2, 3 and mold inserts 6, 7 that define mold cavities 8 and that are made of niobium, tantalum, zirconium, and or alloys thereof and not titanium aluminide. Thus, the surfaces forming cavities 8 that are inspected at column 7, lines 3-4 of the '212 patent are not made of titanium aluminide.

There simply is no disclosure or suggestion in the '212 patent that it is conventional to clean TiAl molds. There also is no disclosure or suggestion of the combination of steps of claim 16. Moreover, the '212 patent is utterly silent with respect to provision of a rare earth element in a titanium aluminide alloy as set forth in claims 18-20.

The '442 patent and the '212 patent simply do not make up for the deficiencies of the WO'973 document.

For the above reasons, independent claim 16 is believed to patentably distinguish over the cited WO'973 document taken with the '442 patent and the '212 patent. With respect to the depending claims, claim 18 recites including a rare earth element in the titanium aluminide alloy to prolong resistance to attack of the die, shot sleeve, and/or plunger by the molten metallic material comprising aluminum in a manner not suggested by the cited references. Claim 19 recites including the rare earth element in a predominantly gamma TiAl to increase its service life in contact with the molten metallic material comprising aluminum in a manner not suggested by the cited references. Claim 20 recites including yttrium (Y) in the titanium aluminide alloy of one or more of a die, shot sleeve, and plunger to prolong resistance to attack by the molten metallic material comprising aluminum in a manner not suggested by the cited references.

The cited references taken alone or together do not render obvious Applicants' claims 16-20. The Section 103 rejection of

claims 16-20 is believed to be violative of the In re Spormann decision cited above as well as the Graham v. Deere fountainhead decision regarding obviousness. The sheer number of references cited by the examiner as well as their numerous deficiencies discussed above evidence the incorrectness of the Section 103 rejection.

THIRD ISSUE

The rejection of claims 10-15 and 21-24 under the judicially created doctrine of obviousness-type double patenting over claims 1-14 of US Patent 6,283,195 ('195 patent) taken with the Nazmy et al. US Patent 5 286 442 ('442 patent) is in error.

Applicants note that the '195 patent corresponds to the WO/'973 document and suffers from the same deficiencies as discussed above in connection with the FIRST ISSUE. The examiner correctly acknowledges on page 8, third paragraph of the final rejection that the '195 patent does not teach the use of a titanium aluminide alloy including a rare earth element in an amount effective to prolong resistance to attack of the alloy by molten metallic material comprising aluminum.

The examiner's citation of the '442 patent to make up for the deficiencies of the '195 patent is in error for the same reasons set forth above in connection with the FIRST ISSUE. As discussed above, the '442 patent discloses only an improvement in hardness and strength achieved in ambient air testing. The '442 patent nowhere discloses contacting a titanium aluminide alloy with molten metallic material comprising aluminum and nowhere discloses or suggests a method of increasing service life of such an alloy in contact with such molten metallic material. The mechanical properties measured in ambient air in the '442 patent teach absolutely nothing about the resistance of the alloys to attack by contact with a molten metallic material comprising aluminum. The examiner is incorrect in using mechanical property test data determined for titanium aluminide alloys in air to

extrapolate or predict the effect of an alloying element, such as a rare earth element, on resistance of the alloy to attack by such molten metallic material. To do so amounts to mere speculation on the examiner's part and is in violation of the In re Spormann decision cited above.

Applicants again refer to the Table on page 4 of their specification and its showing of a dramatic prolongation of the resistance of the tested titanium aluminide alloys to attack by molten aluminum as compared to a titanium alloy that is representative of that of the '195 patent. Such dramatic prolongation of resistance to attack is not known from the '195 patent or the '442 patent pursuant to the In re Spormann decision.

Independent claims 10 and 21 and the claims depending therefrom are believed to distinguish over the cited references for the same reason as set forth above with respect to the FIRST ISSUE.

The obviousness type double patenting rejection of claims 10-15 and 21-24 is believed to be violative of the In re Spormann decision cited above as well as the Graham v. Deere fountainhead decision regarding obviousness.

CONCLUSION

FIRST ISSUE

It is respectfully submitted that the Section 103 rejection of claims 10-15 and 21-24 as obvious under 35 USC 103(a) in view of the WO 00/45973 document taken with the Nazmy et al. US Patent 5 286 442 is in error and should be reversed.

SECOND ISSUE

It is respectfully submitted that the Section 103 rejection of claims 16-20 as obvious under 35 USC 103(a) in view of the WO 00/45973 document taken with the Nazmy et al. US Patent 5 286 442 and the further Choudbury et al. US Patent 6 443 212 is in error and should be reversed.

THIRD ISSUE

It is respectfully submitted that the rejection of claims 10-15 and 21-24 under the judicially created doctrine of obviousness-type double patenting over claims 1-14 of US Patent 6,283,195 taken with the Nazmy et al. US Patent 5 286 442 is in error and should be reversed.

Respectfully submitted,

Kathryn A. Marra
Reg. No. 39106
313/665-4708

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APPENDIX

10. A method of increasing the service life of a titanium aluminide alloy in contact with a molten metallic material comprising aluminum, comprising including in the titanium aluminide alloy a rare earth element in an effective amount to prolong resistance to attack of the alloy by the molten metallic material and contacting the alloy with the molten metallic material.

11. The method of claim 10 wherein said rare earth element is included in a predominantly gamma phase TiAl alloy.

12. The method of claim 10 wherein said rare earth element comprises Y included in an amount of about 1.5% to about 5.5% by weight of the alloy.

13. The method of claim 10 including forming a surface oxide in-situ on the alloy.

14. The method of claim 13 wherein the surface oxide is formed by cooling a hot casting comprising said alloy in air.

15. The method of claim 13 wherein the surface oxide is formed in-situ by heating said alloy in an oxygen bearing atmosphere.

16. A method of prolonging resistance of a titanium aluminide alloy to a molten metallic material comprising aluminum, comprising contacting the alloy for a time with the molten metallic material, removing the alloy from contact with the molten metallic material, cleaning the alloy to remove the metallic material thereon, heating the alloy in an oxygen-bearing atmosphere at elevated superambient temperature to form a surface oxide thereon, and re-contacting the alloy having the surface film thereon with the molten metallic material.

17. The method of claim 16 including prior to first contacting the alloy with the molten metallic material, heating the alloy in an oxygen-bearing atmosphere at elevated temperature to form a surface oxide thereon.

18. The method of claim 16 including providing a rare earth element in the alloy.

19. The method of claim 18 wherein the rare earth element is provided in a predominantly gamma phase TiAl alloy.

20. The method of claim 18 wherein the rare earth element is Y.

21. In a method of die casting a molten metallic material comprising aluminum, wherein the molten metallic material is introduced into a die from a shot sleeve using a plunger in the shot sleeve, the improvement comprising providing one or more of said die, shot sleeve, and plunger as a titanium aluminide alloy including a rare earth element in an effective amount to prolong resistance to attack of said one or more of said die, shot sleeve and plunger by the molten metallic material.

22. The method of claim 21 wherein said titanium aluminide alloy includes Y.

23. The method of claim 22 wherein said Y is present in said alloy in an amount of about 1.5% to about 5.5% by weight of said alloy.

24. The method of claim 21 wherein a core element is disposed in the die and comprises said titanium aluminide alloy.